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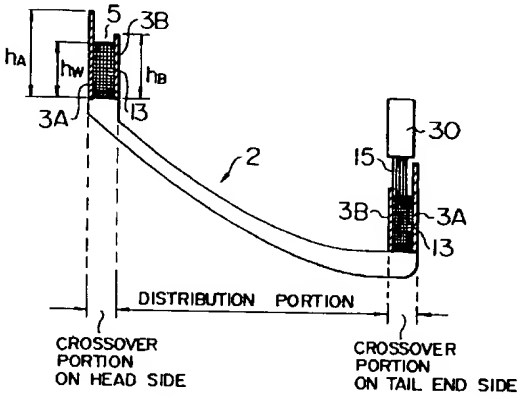
(54) Saddle type bobbin for deflection coil.

(57) A saddle type bobbin (2) for a deflection coil, comprises a plurality of coil-winding groove rows (5) for winding up a conductive wire row member (wire ribbon) (15); and crossover grooves (18,19) for fitting a crossover portion of the deflection coil. Each of the crossover grooves (18,19) is defined between an outer flange (3A) and an inner flange (3B) of the bobbin (2), and disposed on the head side and tail end side of the bobbin (2) . In this arrangement the saddle type bobbin (2) for deflection coil is constructed such that the height of said inner flange (3B) is equal to, or smaller than that of the corresponding outer flange (3A), thus avoiding that the wire delivering nozzle strikes against the inner flange (3B).

FIG.9



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The present inv ntion relates to a saddle type bobbin for a defl ction coil of a deflection yok mounted on television receivers or display units.

2. Description of the Prior Art

In recent years, development of television receivers into those of high-vision and appearance of high fine display units, increasingly tend to demand strict specifications relating to color mismatching, i.e., convergence of the cathode-ray tube screen of these apparatus. Under such tendency, it is earnestly desired that a deflection magnetic field be controlled more precisely.

Fig.1 shows an example of a bobbin for a saddle type deflection coil for use in a typical deflection yoke. The bobbin 2 is provided with a plurality of coil-winding grooves 5, on which, for example, a coiling wire 11 is wound in layers as shown in Fig.2, to thereby form a deflection coil. The coiling wire 11 uses one of conductive wires (including litz wires) with an insulating layer 4 provided thereon which is coated with an adhesive on its peripheral.

In winding the coiling wire 11 on the aforementioned coil-winding grooves 5, the coiling wire 11 is wound in layers by a flyer type automatic winding machine, one by one, or by every some wires, with being unbounded or separated in a form of single wires, whereby a deflection coil will be produced. Subsequently, the thus layer-wound coil is supplied with an electric power, to heat and melt the adhesive applied outside the insulating layer 4, so that the coil wires adhere to each other to complete a deflection coil.

Such prior art deflection coil, however, suffers from difficulties: owing to variation of the stretching force acted on coiling wire 11 as it is wound and other reasons, the coiling wire 11 is displaced and biassed as shown in Fig.2, and in other cases, the order of winding of coiling wire 11 is altered and hence such winding as previously designated by a design instruction cannot be practiced. Further, the biassed states of coiling wire 11 of deflection coil that is mass-produced differ from one another for each article, therefore, it would be impossible to regulate a deflection field with high precision. Additionally, mass-production makes dispersion of products larger, resulting in lowering of the yield, and hence the prior art winding method is disadvantageous in view of the cost. Even in the just-mentioned prior art method, the coiling wire 11 is reduced in its displacement and biassed winding as the width of the coil-winding groove is narrowed to satisfy an original design, but followed by another problem of coil performance being deteriorated because of a ratio L/R between inductance L and resistance R being reduced.

In order to eliminat such problems, the present applicant has previously proposed a deflection coil which is composed by forming a conductiv wire row memb r (which will be referred to as "wir ribbon" her inafter) in which a plurality of adjoining conductive wires ar arranged parall l in a row as shown in Figs.3A to 3D, and winding this member in place of winding a single wire one by one as used to be practiced.

Examples of wire ribbon 15 include one that is composed as shown in Fig.3A by arranging in parallel a plurality of conductive wires 8 of copper, aluminum or the like with an insulating layer 4 coated thereon, and adhering them using an adhesive 6; one that is composed as shown in Fig.3B by arranging in parallel a plurality of conductive wires 8 with an insulating layer 4 coated thereon, and adhering together the wires on one side of an insulator sheet 7 of resin, etc., with an adhesive 6; one that is composed as shown in Fig.3C by arranging and adhering together in parallel a plurality of conductive wires 8 formed with an insulating layer 4 and an adhesive layer 9; and one that is composed as shown in Fig.3D by arranging a plurality of conductive wires in a contacting manner in a row, each wire being with an insulating layer 4 covered by a thermoplastic adhesive layer 20.

The conductive wires 8 forming the aforementioned wire ribbon 15 are arranged in parallel with one another in an orderly manner in a row, and therefore, neither will each conductive wire 8 be displaced in wire ribbon 15, nor will the order of the wires be altered. Therefore, when this wire ribbon 15 is used, namely, the wire ribbon 15 is wound in layers, it is possible to produce a deflection coil free from the problems such as significant displacement of the conductive wires 8, and the like.

The production of such a deflection coil as described above is achieved by inserting the wire ribbon into a coil-winding groove 5 having a flange 3 so as to wind it in layers in parallel to the bottom face 10 of the groove 5. The deflection coil formed with the wire ribbon 15 can be remarkably improved in its characteristics as compared with those in the prior art.

Meanwhile, a saddle type bobbin for the deflection coil typically has coil-winding grooves 5 in its crossover portions 18, 19 disposed respectively on head and tail end sides thereof, as is exemplarily shown in Fig.S. The height of an inner side flange 3B of the coil-winding groove 5 is formed higher than that of a corresponding outer side flange 3A thereof. If wire ribbon 15 is tried to be wound in coil-winding groove 5 of the bobbin 2 using a flyer type winding machine (not shown) for winding conventional single wires, the wire ribbon 15 would be wound twisted in crossover portions 18, 19, or displaced from coil-winding groove 5, since the front end of the nozzle of the winding machine is arranged apart away from coil-winding groov 5. To deal with this, th applicants hereof hav already proposed a method of winding wire ribbon 15 by supplying and inserting it stably into coil-winding groove 5 using a wire winding

machin having a structure as shown in Figs.6A and 6B in which a distance between th front nd of th nozzle for delivering wire ribbon 15 and coil-winding groov 5 can be shortened.

The winding machine of this previously proposed exampl is configurated as shown in Figs.6A and 6B. Specifically, ther are provided a base 1, a supporting column 17, a bobbin attachment table 33, a bobbin holding member 31, a bobbin 25 for wire ribbon 15, a bobbin rotating mechanism 12, a back-tension adding means 16, a wire ribbon 15, a nozzle supporting table 26, a nozzle rotating mechanism 28, a nozzle shaft 27, a nozzle 30 disposed in a front end of the nozzle shaft, a nozzle head 23, a nozzle supporting column 35, a bobbin 2, a supporting table 41 for bobbin 2, a bobbin holding portion 42, an arm 40, a first bobbin rotating mechanism 38, a bobbin-side supporting column 37, and a second bobbin rotating mechanism 44.

The aforementioned wire ribbon 15 coiled on bobbin 25 is inserted through nozzle shaft 27 while being tension-adjusted by tension adding means 16. The front end of nozzle 30 for delivering wire ribbon 15 is disposed close to coil-winding groove 5 of bobbin 2. Nozzle shaft 27 is rotatable in both clockwise and anti-clockwise directions as desired by means of nozzle rotating mechanism 28. Nozzle supporting table 26 is attached movable in a vertical direction shown by Y to nozzle supporting column 35. Nozzle supporting 35 is placed upright movable in a horizontal direction shown by X. Attached to the lower end of nozzle shaft 27 is nozzle 30, which is rotatable to a desired direction.

Bobbin holding portion 42 of bobbin 2 is shiftable in Z-direction (a direction normal to the document surface in Fig.6B). The bobbin 2 is rotatable about X-axis in link with the rotation of first bobbin rotating mechanism 38 and is driven rotatably about Z-axis in link with second bobbin rotating mechanism 44.

The above, respective rotating and shifting mechanisms are controlled by means of an illustrated control device, so that wire ribbon 15 can be wound smoothly in layers into coil-winding groove 5 of bobbin 2 to thereby form a deflection coil.

Now, fabrication procedures of a saddle type deflection coil using this wire winding machine will be explained with reference to Fig.7A to 7I. In the beginning, as shown in Fig. 7A, wire ribbon 15 is fit into a groove disposed in the right side inner circumferential wall 45 of bobbin 2 while bobbin 2 being moved in a direction of arrow and nozzle 30 being moved in X-axis direction facing the inner side of the bobbin with keeping a predetermined distance therebetween. When nozzle 30 reaches the upper side or head side of bobbin 2, nozzle 30 will be rotated from a position 'a' through a position 'b' to a position 'c' in a course shown by arrows as shown in Fig.7B. In this while, wire ribbon 15 may be wound smoothly if nozzl 30 is once rotated up to a position b yond flange 3B so as to round out th wir ribbon, and then returned to the position 'c'. N xt, bobbin 2 is rotated about X-axis by 90 degrees in th clockwise direction to mak a state shown in Fig.7C. From this state, bobbin 2 is rotated by 180 degrees in the anti-clockwise direction about an X-axis passing through a point Z_1, to thereby make a state shown in Fig.7D. As a result, wire ribbon 15 is fit to the crossover portion on the head side of bobbin 2. Then, bobbin 2 is rotated 90 degrees in the clockwise direction about the X-axis to reach a state shown in Fig.7E. After the rotation, nozzle 30 is rotated from the position 'c' through a position 'd' to the position 'a' in a course shown by arrows in Fig.7E. In this case, wire ribbon 15 may be wound smoothly if nozzle 30 is once rotated beyond flange 3B so as to round out the wire ribbon, and then returned to the position 'a'.

Next, in this state, bobbin 2 is shifted downward along Z-axis, and nozzle 30 being moved left in X-axis direction while facing the inner side of the bobbin with keeping a predetermined distance therebetween, whereby wire ribbon 15 is fit into a groove disposed on the opposite side. When bobbin 2 goes down to reach a position where the center of the groove of the crossover portion on the tail end side of bobbin 2 faces nozzle 30, the nozzle 30 is moved from the position 'a' through the position 'b' to the position 'c' in a course shown by arrows in Fig.7F. Also in this case, nozzle 30 is once rotated up to a position beyond flange 3B so as to round out wire ribbon 15, and then returned to the position 'c'. Then, bobbin 2 is rotated 90 degrees in the clockwise direction about the X-axis to reach a state shown in Fig.7G. From this state, bobbin 2 is rotated 180 degrees in the anti-clockwise direction about Z-axis to thereby make a state shown in Fig.7H. As a result, wire ribbon 15 is fit to the crossover portion on the tail end side of bobbin 2.

Next, bobbin 2 is rotated 90 degree in the clockwise direction about X-axis to make a state shown in Fig.7I. In this state, nozzle 30 is once rotated opposite to a position beyond flange 3B so as to round out the wire ribbon 15, and then, nozzle 30 is rotated from the position 'c' through the position 'd' to the position 'a' in a course shown by the arrow. As a result, the operation returns to the initial state shown in Fig.7A, and the cycle described heretofore will be repeated to wind up wire ribbon 15 successively into each groove of bobbin 2, whereby a saddle type deflection coil may be completed.

In the above structure where inner flange 3B of the crossover portion is formed higher than a corresponding outer flange 3A for either the head side or tail end side of bobbin 2, it has become known that when nozzle 30 travels from the inner side with respect to th longitudinal direction of th bobbin to th crossover porti n, for xampl , when nozzl 30 is rotated from the position 'a' through the position 'b' to the position 'c' in th cours shown by th arrow, wire

ribbon could be smoothly wound if nozzl 30 is once rotated up to a position beyond inner flange 3B so as to round out wire ribbon 15, and then is returned to the position 'c'. H wever, winding in this manner tends to cause nozzle 30 to strike against inner flange 3B, and thus the operation becomes difficult. This difficulty is easy to occur in all the steps shown Figs.7B, 7E, 7F and 7I.

Further, when a complete deflection coil with a cover 22 fit over the flanges 3A and 3B of the tail end side crossover potion 18 is fixed tightly to a cathode ray tube using a band 24, the greater height of inner flange 3B of coil-winding groove 5 makes cover 22 bulky, requiring a large space.

The present invention has been achieved to eliminate the above problems, and it is an object of the present invention to provide a saddle type bobbin for deflection coil wherein a conductive wire row member (or wire ribbon) can be wound with precision by a simple winding operation that may prevent a nozzle from colliding against crossover portion while the wire ribbon is wound on the saddle-shaped bobbin.

The above object of the present invention can be achieved by providing a saddle type bobbin for deflection coil, comprising a plurality of coil-winding groove rows for winding up a wire ribbon; and crossover grooves for fitting crossover portion of the deflection coil, each of the crossover grooves being defined between an outer flange and an inner flange of the bobbin, and disposed on its head side and tail end side of the bobbin, and being characterized in that the height of the inner flange is equal or smaller than that of the corresponding outer flange.

In accordance with the aspect and feature of the bobbin stated above, a wire ribbon is fit into a coil-winding groove by once rotating a nozzle for delivering the wire ribbon up to a position beyond the inner flange so as to round out the wire ribbon when the nozzle travels from the inner side with respect to the longitudinal direction of the bobbin to the crossover portion, and returning the nozzle to a center of the coil-winding groove. Upon this process, it is possible to carry out coil-winding without causing collision of the nozzle with the inner flange, which would occur otherwise unless the height of the inner flange is equal or smaller than that of the corresponding outer flange.

As described above, since the height of the inner flange is set equal or smaller than that of the corresponding outer flange in both the crossover portions on the head side and tail end side, wire ribbon can be wound into the coil-winding grooves with positioning the front end of the nozzle for delivering wire ribbon closer to the height of the outer flange of the coil-winding groov . As a result, the wir ribbon can be wound up stably and exactly without failure.

Moreover, since the height of the inner flange is set qual or smaller than that of th corresponding outer flange in both the crossov r portions, wh n the nozzle rotates, or travels from the inner side of the bobbin with respect to longitudinal direction thereof to the crossov r portion, or vice versa, it is possible to prevent collision of the nozzle with the inner flange, facilitating the winding operation.

The above and many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the following detailed description and accompanying drawings in which preferred structural embodiments incorporating the principles of the present invention are shown by way of illustrative example.

Fig.1 is a schematic perspective view showing an example of a prior art saddle type bobbin for deflection coil;

Fig.2 is a sectional view partially showing a state of coil-windings in a prior art deflection coil;

Figs.3A to 3D are schematic perspective and sectional views showing different types of prior art conductive wire row members (wire ribbons);

Fig.4 is an illustration showing a fabrication example of a prior art deflection coil by winding a wire ribbon in layers;

Fig.5 is a illustrative diagram showing a coil-winding state of a wire ribbon on a prior art saddle type bobbin for deflection coil;

Figs.6A and 6B are, respectively, top and side views schematically showing a prior art wire winding machine;

Figs.7A to 7I are illustrations showing conventional operation steps of winding a wire ribbon;

Fig.8 is a sectional view partially showing a prior art bobbin with a cover being fit over flanges on its tail end (neck) side;

Fig.9 is a constructional illustration showing elemental portions of a saddle type bobbin for deflection coil in accordance with one embodiment of the present invention; and

Fig.10 is a schematic perspective view showing a bobbin cut in half of a saddle type bobbin for deflection coil of the invention shown in Fig.9.

An embodiment of the invention will hereinafter be described with reference to the accompanying drawings. In the description of the embodiment of the invention, like reference numerals will be allotted for the same parts with those in the previously described prior art example, and the detailed description for those parts will be omitted to avoid the repetition. Fig.9 shows main configurations of a saddle type bobbin for deflection coil in accordance with the embodiment of the present invention. Fig.10 shows a schematic perspective view of a saddle type bobbin for d flection coil shown cut in half in accordance with the embodiment of the present invention.

Characteristic feature of the embodiment of the invention lies in that th height of an inner flang of

a coil-winding groov disposed for each of crossover portions on head sid and tail end (neck) side of a bobbin is qual or less than that of a corresponding outer flang , and the other configurations are the same with those of the prior art xample.

As shown in these figures, bobbin 2 has coil-winding grooves 5 defin d between outer and inner flanges 3A and 3B in its crossover portions 18, 19 disposed respectively on head and tail end sides thereof. The height of inner flange 3B of the coil-winding groove 5 is formed smaller than that of outer flange 3A thereof. Nozzle 30 for delivering wire ribbon 30 is disposed close to flange 3A of coil-winding groove 5.

Next, when a deflection coil is fabricated by winding wire ribbon 15 on saddle type bobbin 2 for deflection coil having the above structure using a wire-winding machine described in the prior art, the same winding procedures or steps as those illustrated in Figs.7A to 7B are conducted.

According to this embodiment, since the height of inner flange 3B of a coil-winding groove disposed for each of the crossover portions on head side and neck side of the bobbin is less than that of the corresponding outer flange 3A, wire ribbon 15 can be wound into the coil-winding groove 5 formed in the crossover portion with keeping nozzle 30 for delivering wire ribbon 15 closer to the groove. As a result, wire ribbon 15 is can be wound up stably and exactly without displacing or deviating from the groove of the crossover portion. In addition, since the height of inner flange 3B is smaller than that of outer flange 3A, collision between nozzle 30 and flange 3B does not occur when nozzle 30 is rotated beyond flange 3B so as to round out the wire ribbon in each step of Figs.7B, 7E, 7F and 71. Consequently, the operation becomes simplified.

Further, since the height of inner flange 3B is smaller than that of outer flange 3A, cover 22 of tail end side can be made smaller, thus making it possible to reduce the space required on the tail end side.

It should be noted that the present invention is not be limited to the above embodiment, but various other configurations can be adopted. For example, although in the above embodiment the height of inner flange 3B of the crossover portion is smaller than that of outer flange 3A, inner flange 3B may be as high as corresponding outer flange 3A. More specifically, the present invention will work well if a relation $h_W \leqq h_B \leqq h_A$ holds, where h_W denotes a height of a layered coil 13 of the wire ribbon in coil-winding groove 5 of the crossover portion, h_B and h_A represent heights of outer flange 3A and inner flange 3B, respectively.

Claims

1. A saddle type bobbin (2) for a deflection coil, comprising a plurality of coil-winding groove rows (5) for winding up a conductiv wire row member (15); and crossover grooves (18, 19) for fitting a crossover portion of said deflection coil, ach of said crossover grooves (18, 19) being d fined betwe n an outer flang (3A) and an inn r flang (3B) of said bobbin, and disposed on the h ad sid and tail nd sid of said bobbin,
being characterized in that the height of said inner flange (3B) is equal to, or smaller than that of said corresponding outer flange 3A.

FIG. 1
PRIOR ART

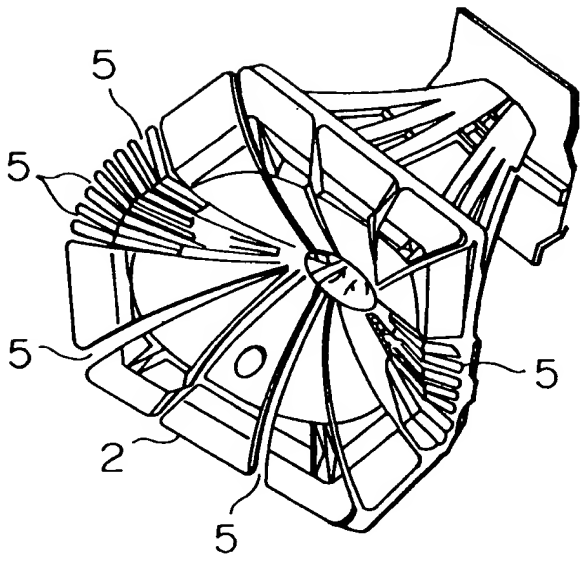


FIG. 2
PRIOR ART

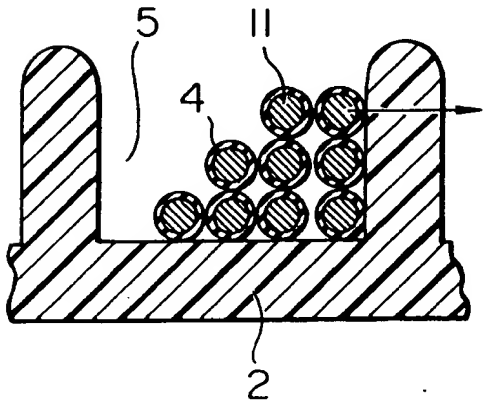


FIG. 3A
PRIOR ART

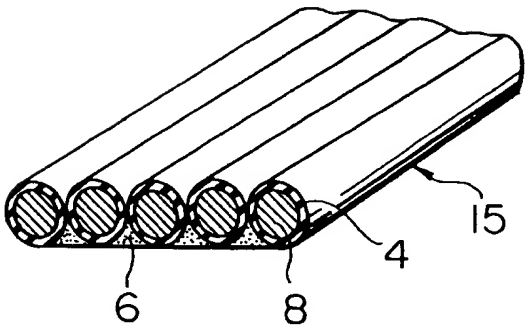


FIG. 3B
PRIOR ART

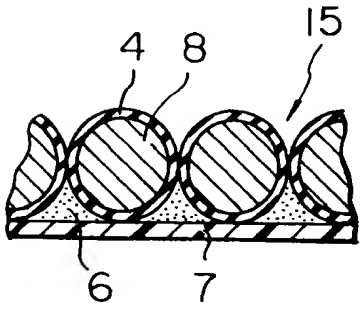


FIG. 3C
PRIOR ART

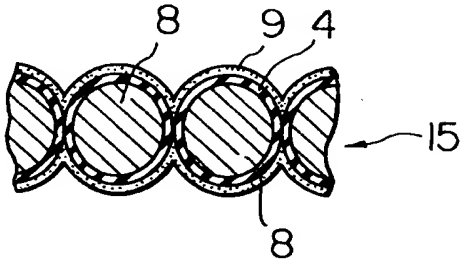


FIG. 3D
PRIOR ART

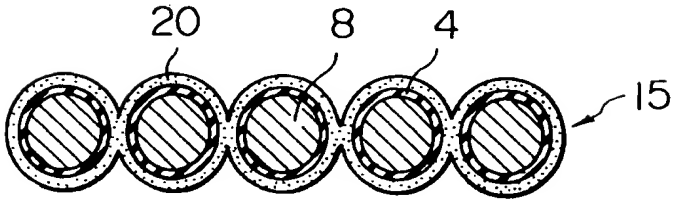


FIG. 4
PRIOR ART

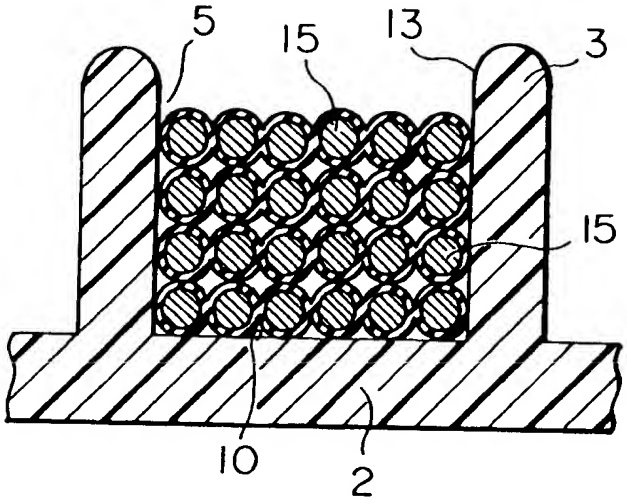


FIG. 5
PRIOR ART

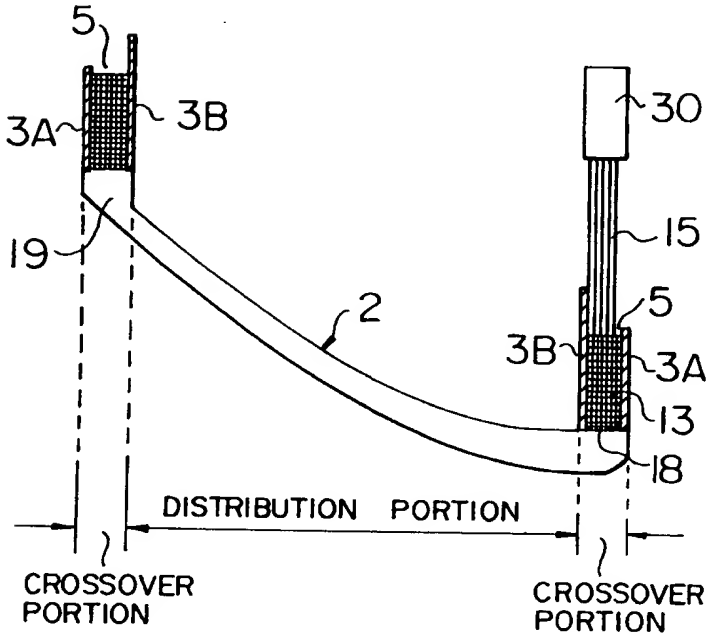


FIG. 6A
PRIOR ART

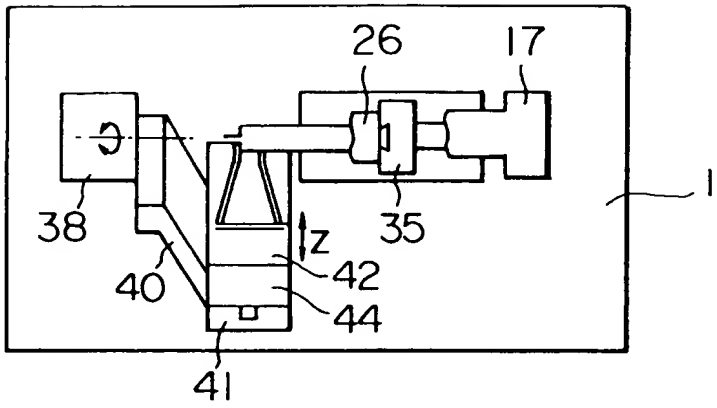


FIG. 6B
PRIOR ART

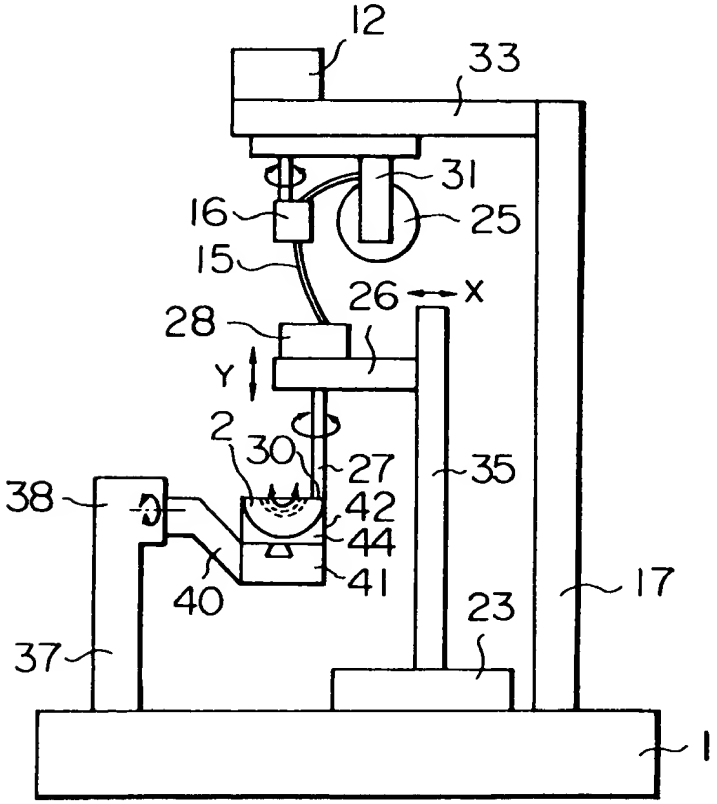


FIG. 7A
PRIOR ART

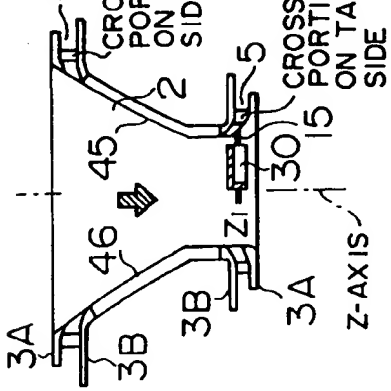


FIG. 7B
PRIOR ART

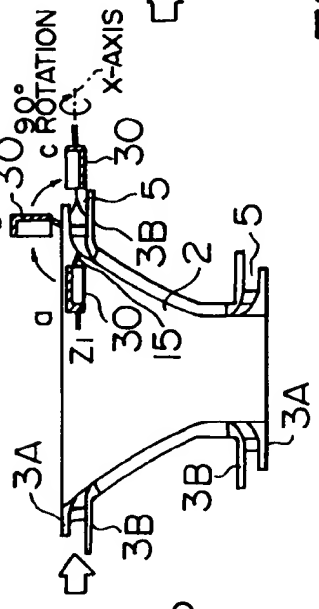


FIG. 7C
PRIOR ART

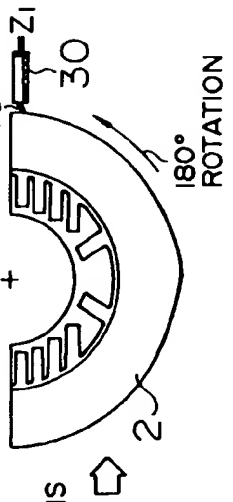


FIG. 7D
PRIOR ART

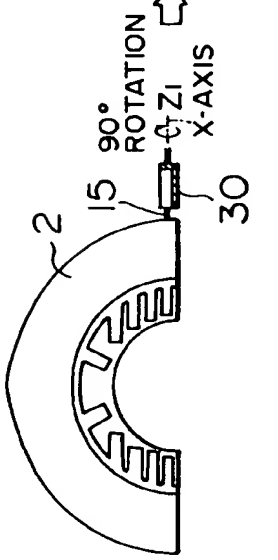
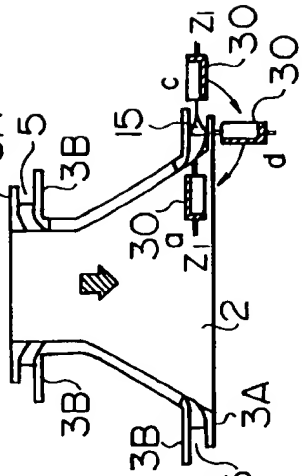


FIG. 7E
PRIOR ART



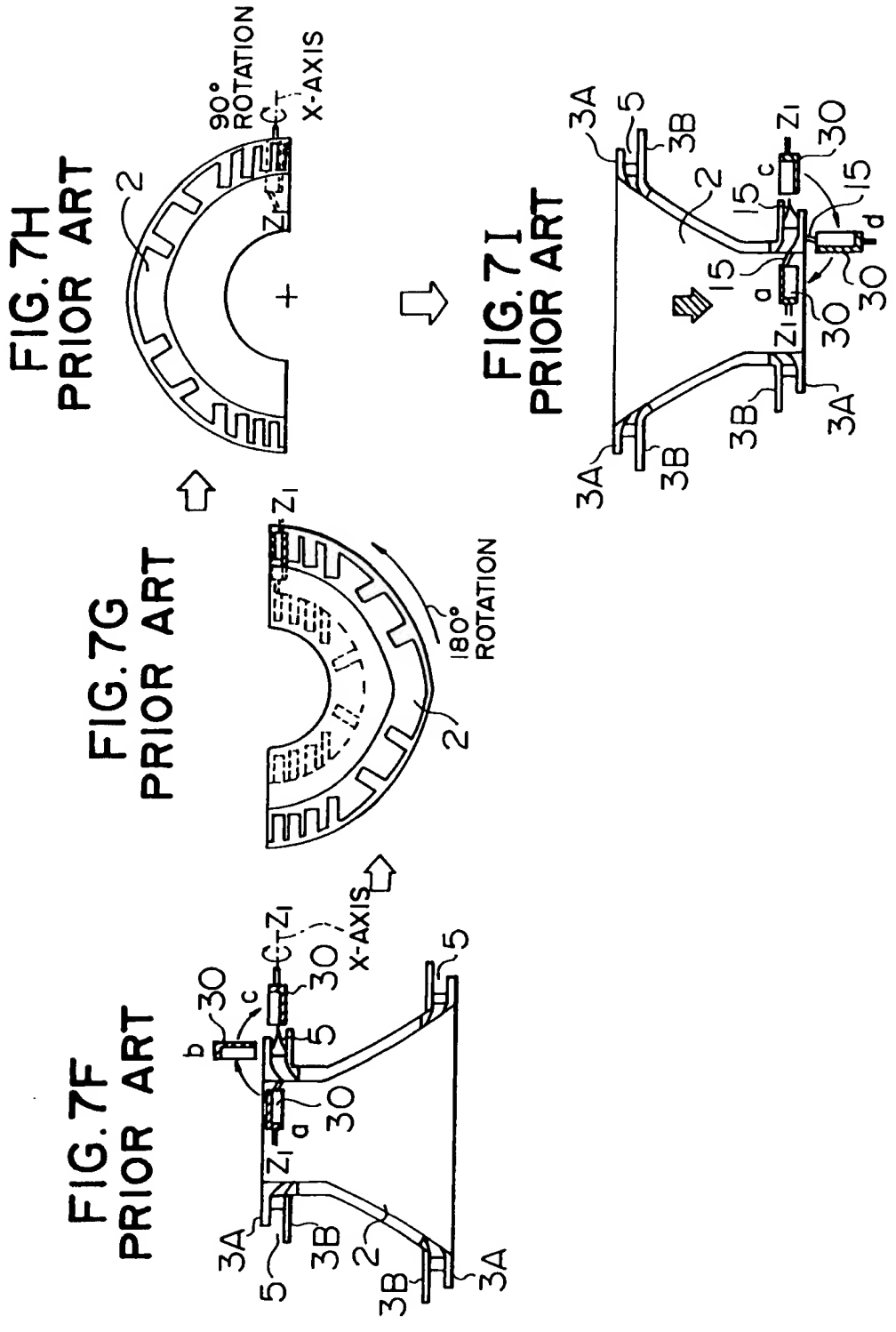


FIG. 7F
PRIOR ART
FIG. 7G
PRIOR ART
FIG. 7H
PRIOR ART
FIG. 7I
PRIOR ART
X-AXIS
90° ROTATION
180° ROTATION
3A
3B
5
30
2
15
a
b
c
d
Z1
CT

FIG. 8
PRIOR ART

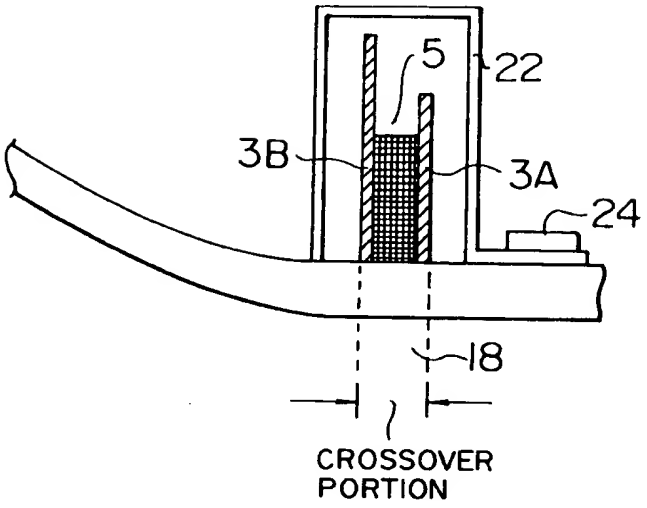


FIG. 9

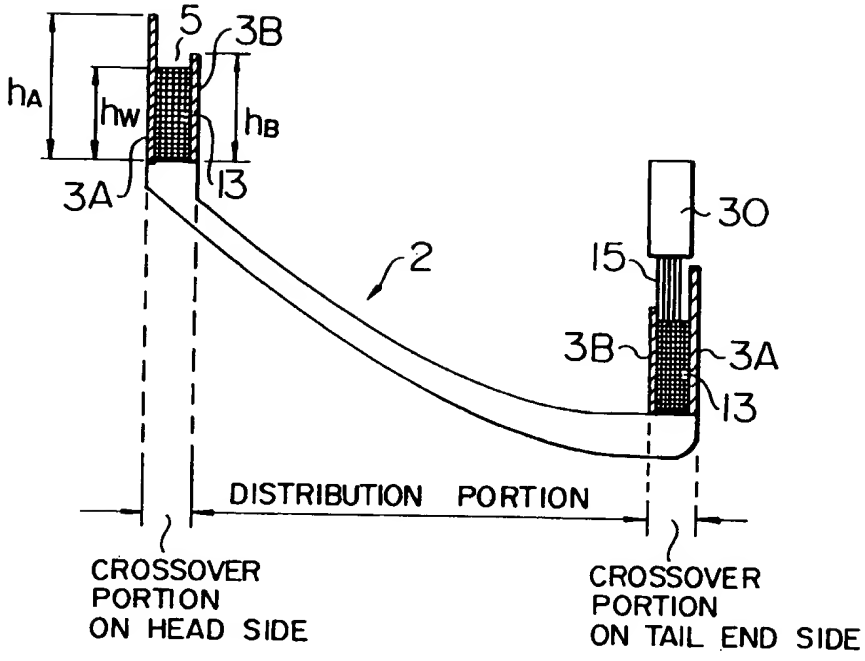
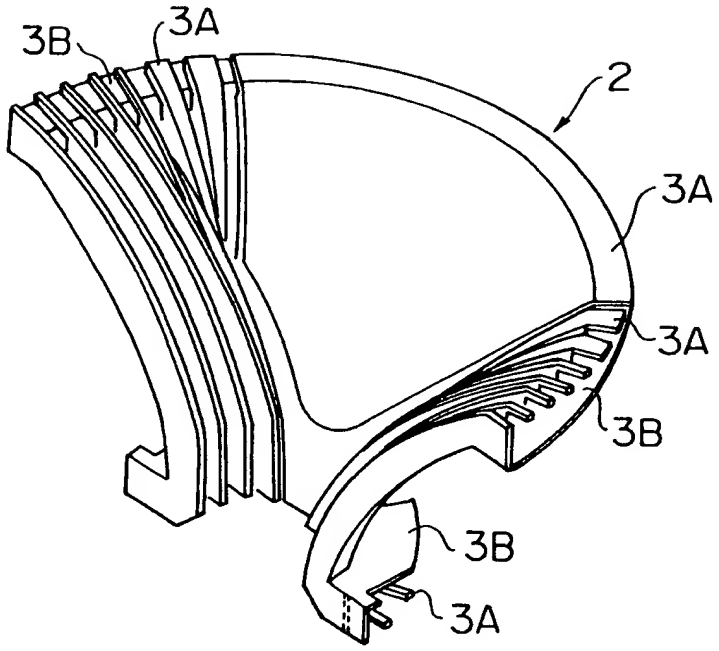


FIG. 10



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 3990

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-C-2 744 048 (LICENTIA PATENT-VERWALTUNGS-GMBH) * column 1, line 62 - column 2, line 2 * * column 2, line 9 - line 27 * * column 2, line 58 - column 4, line 19 * * figures *	1	H01J9/236 H01J29/76 H01F41/06
A	EP-A-0 405 209 (NOKIA UNTERHALTUNGSELEKTRONIK GMBH) * column 1, line 5 - line 9 * * column 4, line 15 - line 20 * * figures 3,4 *	1	
A	EP-A-0 264 807 (STANDARD ELEKTRIK LORENZ) * abstract; figures * * column 1, line 18 - line 21 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) H01J H01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	03 SEPTEMBER 1993	COLVIN G.G.

CATEGORY OF CITED DOCUMENTS

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